NON-PUBLIC?: N
ACCESSION #: 9408240137
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Beaver Valley Power Station Unit 1 PAGE: 1 OF 3

DOCKET NUMBER: 05000334

TITLE: Reactor Trip Rresulting from Main Transformer Fire
Protection System Actuation
EVENT DATE: 07/19/94 LER #: 94-008-00 REPORT DATE: 08/18/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: L. R. Freeland, General Manager TELEPHONE: (412) 643-1258
Nuclear Operations

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: IC COMPONENT: DET MANUFACTURER: T991
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On July 19, 1994 at 1610 hours, with Unit 1 operating at 100% power, an insulating bushing external flash-over on the Unit 1 Main Unit Transformer initiated an immediate Unit 1 generator/turbine trip followed by subsequent Unit 1 reactor trip. The flash-over of the insulating bushing on the Main Unit Transformer occurred during a transformer fire protection system actuation. Water spray from the fire protection nozzles allowed flash-over from the 'C' phase bushing to its base and grounded fire protection piping and conduit beneath the bushing. This damaged the bushing, caused protection relays to isolate the transformer from the electrical grid, and initiated a generator/turbine trip. The unexpected fire protection system actuation that initiated this event occurred when heat detectors sensed conditions that exceeded their actuation setpoint, even though no fire protection system actuation was required. The suspect heat detectors were subsequently tested and

verified to be actuating prematurely. Actions have been implemented to improve main transformer fire protection compatibility with the high voltage transformer application. There were no safety implications as a result of this event. The reactor protection system actuated as designed. The Engineered Safety Feature Systems actuated as required. This report is being submitted in accordance with 10CFR50.73.a.2.iv.

END OF ABSTRACT

DESCRIPTION OF EVENT

On July 19, 1994, Beaver Valley Unit 1 was operating at 100 percent power, steady state conditions. Unit 1 had been on line for 12 days following replacement of the main transformer which failed on June 1, 1994. At 1606 hours, the fire alarm for the main transformer annunciated in the Unit 1 control room. The main transformer fire protection spray valve opened and both fire pumps automatically started. An operator dispatched to the main transformer informed the control room that an arcing noise was coming from the transformer. Abnormal Operating Procedure 1.51.1, Emergency Shutdown, was entered at 1609 hours, and a 5% per minute shutdown was commenced. At 1610 the main generator received a trip signal from the main generator differential, main transformer differential, and 345 KV leads protection relays. The main generator immediately tripped causing an automatic station service bus transfer from the Unit Station Service Transformers to the System Station Service Transformers. All of the necessary breakers operated to their required position. The generator trip caused a turbine trip as designed. The turbine trip initiated a reactor trip signal. Both reactor trip breakers opened and all shutdown and control bank rods fully inserted. Operations personnel entered Emergency Operating Procedure E-0 for a reactor trip. Both emergency busses remained energized. Both emergency diesel generators started but were not required to load. At 1612 hours the operators transitioned to ES-0.1, Reactor Trip Response. At 1635 hours both diesel generators were secured and the plant was stabilized in mode 3 Hot Standby.

CAUSE OF THE EVENT

The cause of this event was a flash-over of an insulating bushing on the Unit 1 Main Unit Transformer. The insulating bushing damages was caused by external flash-over resulting from actuation of the main transformer fire protection fixed water spray system. The heat detectors in the exhaust air stream of the main transformer oil coolers were rated for 135 degrees F with an acceptance range of actuation of 125 degrees F<T< 140

degrees F. With Unit 1 at full power and an outside air temperature of approximately 90 degrees F, the heat detectors were exposed to oil cooler exhaust air stream temperatures in excess of 125 degrees F. This actuated the main transformer fixed water spray system. Over spray from the highest tier nozzles of the transformer fire protection system caused a heavy mist on top of the transformer in the vicinity of the high voltage insulating bushing. This spray and wind currents created the environmental conditions necessary to allow flash-over and subsequent arcing from the 'C' phase bushing to its bases and grounded fire protection piping and conduit beneath the bushing. This arcing damaged the bushing and caused protection relays to isolate the transformer from the electrical grid and initiate a generator/turbine trip.

REPORTABILITY

Beaver Valley Unit 1 reported the reactor trip to the Nuclear Regulatory Commission at 1905 hours in accordance with 10CFR50.72.b.2.ii, as an event involving the actuation of the reactor protection system and engineered safety feature system. This report is submitted in accordance with 10CFR50.73.a.2.iv.

There were no safety implications as a result of this event. The reactor protection system actuated as designed to place the reactor in a safe shutdown condition (Hot Standby). Engineered safety feature systems actuated as required upon receipt of initiation signals.

CORRECTIVE ACTIONS

The following corrective actions have occurred as a result of this event:

1. Following an engineering evaluation, all of the main transformer heat detectors, 32 total, were replaced with heat detectors rated for 194 degrees F.

2. The appropriate nozzles on the top loop of the fire protection fixed water spray system were raised and angled downward to assure appropriate fire protection without creating over spray in the vicinity of the high voltage insulating bushings mounted on top of the main transformer.

3. The damaged bushing was replaced with a new bushing. Testing of the damaged bushing determined that it had not failed internally.

PREVIOUS SIMILAR EVENTS

There have been two similar events previously reported involving component failure of the Unit 1 main unit transformer. Unit 1 LER 94-005 details a bushing failure and Unit 1 LER 78-043 details an internal winding failure.

DIESEL GENERATOR RELIABILITY

Unit 1

Start Failures Load Failures Totals Trigger

Past 20 Site Demands 0/20 0/20 0/20 3/20

Past 50 Site Demands 0/50 0/50 0/50 4/50

Past 100 Site Demands 0/100 0/100 0/100 5/100

EDG 1-1 Past 25 Demands 0/25 0/25 0/25 4/25

EDG 1-2 Past 25 Demands 0/25 0/25 0/25 4/25

ATTACHMENT TO 9408240137 PAGE 1 OF 2

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August 18, 1994
ND3MNO:3604

Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, Licensee No. DPR-66
LER 94-008-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 94-008-00, 10 CFR 50.73.a.2.iv., "Reactor Trip Resulting from Main Transformer Fire Protection System Actuation".

L. R. Freeland
General Manager
Nuclear Operations

DLL/clp

Attachment

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